

Presentation title: Good data quality is a key to successful digital transformation

Presentation date: 2022-05-09 1:30 PM

Presenter name: Oliver Yalcintepe

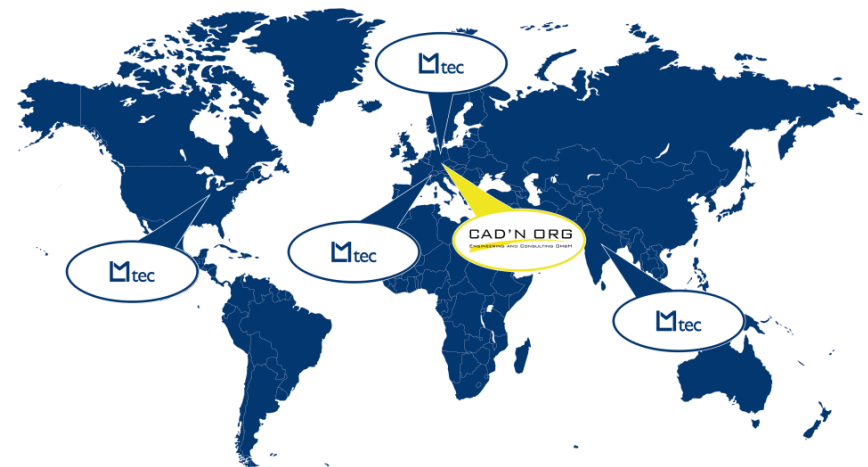
Contact: oyalcintepe@cadnorg.eu

Our Company

- Focus: PLM Consulting, Administration and Helpdesk
- Founded 1998
- Own software development to optimize Teamcenter
- Partner of Siemens Digital Industry Software



Member of the global LMtec Group with locations in Germany, Switzerland, India, Serbia, Canada and United States.



Agenda: Data quality a key to successful digital transformation

Part 1: Key points

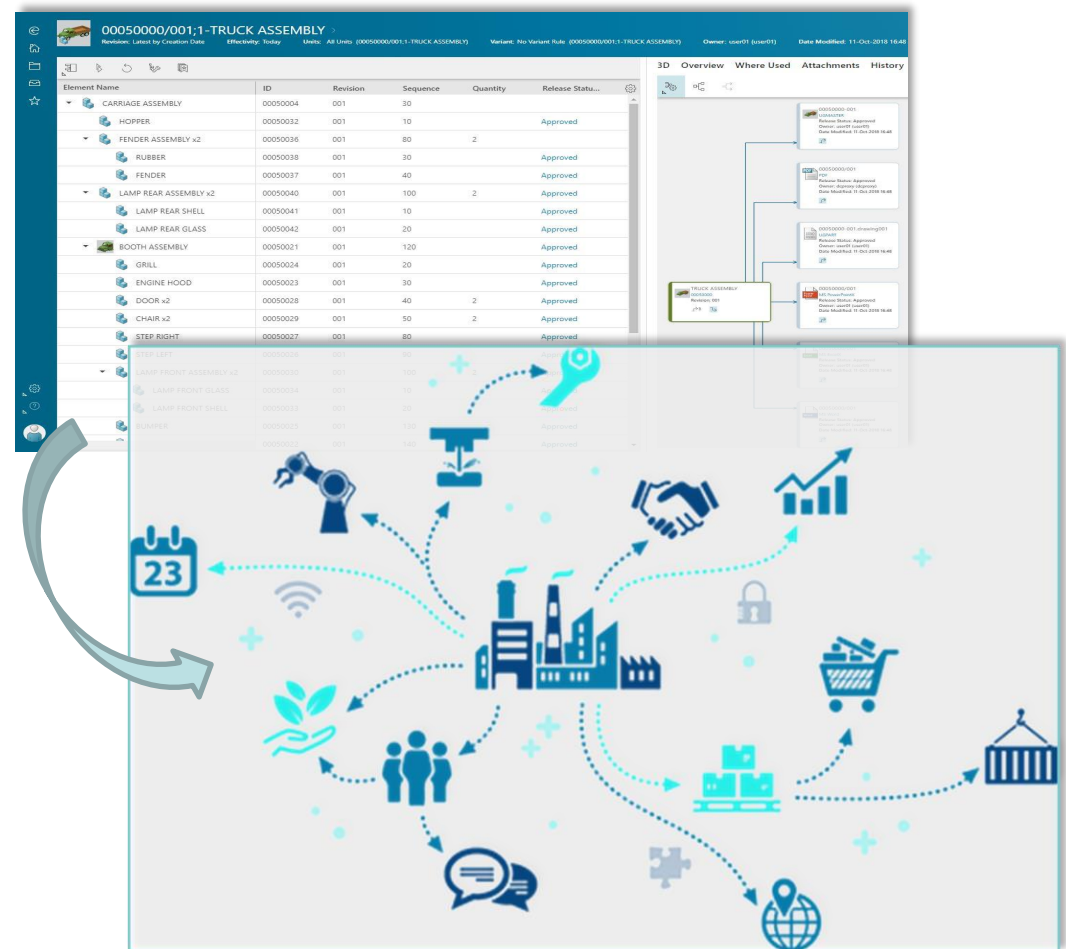
- Impact of poor data quality
- Causes of data leaks in the PLM system
- Why automated data validation
- How to ensure data consistency

Part 2: Case studies

- Validation during data creation
- Simplification of release processes
- Changes and Validation Reports

Impact of poor data quality on your business

- Expensive corrections in later development phases
- Problem in the supply chain
- Unprecise manufacturing data
- Corrupted data
- Missing product information
- Use of wrong or obsolete parts
- Incomplete orders
- Outdated part catalog data
- etc.



Causes of data leaks in the PLM system

- Incomplete work instructions
- No use of naming conventions
- Insufficient automation
- Incorrect use of object types
(complex structures)
- Different templates for documents
- Missing guidelines
- Migrated data
- Lack of input and output management
- Missing integration with other systems
- Software errors
- ...

The screenshot displays a PLM system interface for a 'TRUCK ASSEMBLY'. The main table lists components with their IDs, revisions, sequences, quantities, and release statuses. Several yellow callouts point to specific data issues:

- Mismatch of release status on sub assemblies:** Points to the 'LAMP REAR GLASS' component, which has a release status of 'Approved' while its parent assembly is in a different state.
- Missing data for ERP transfer:** Points to the 'BOOTH ASSEMBLY' component, which has missing data fields required for ERP integration.
- Use of obsolete Vendor parts:** Points to the 'LAMP FRONT ASSEMBLY' component, which is marked as obsolete.
- 0 Byte PDF for Archiving:** Points to a PDF file in the 'Attachments' section, which is a 0-byte file, indicating a software error or data corruption.
- Missing description for documentation:** Points to a component in the BOM tree that lacks a descriptive text field.

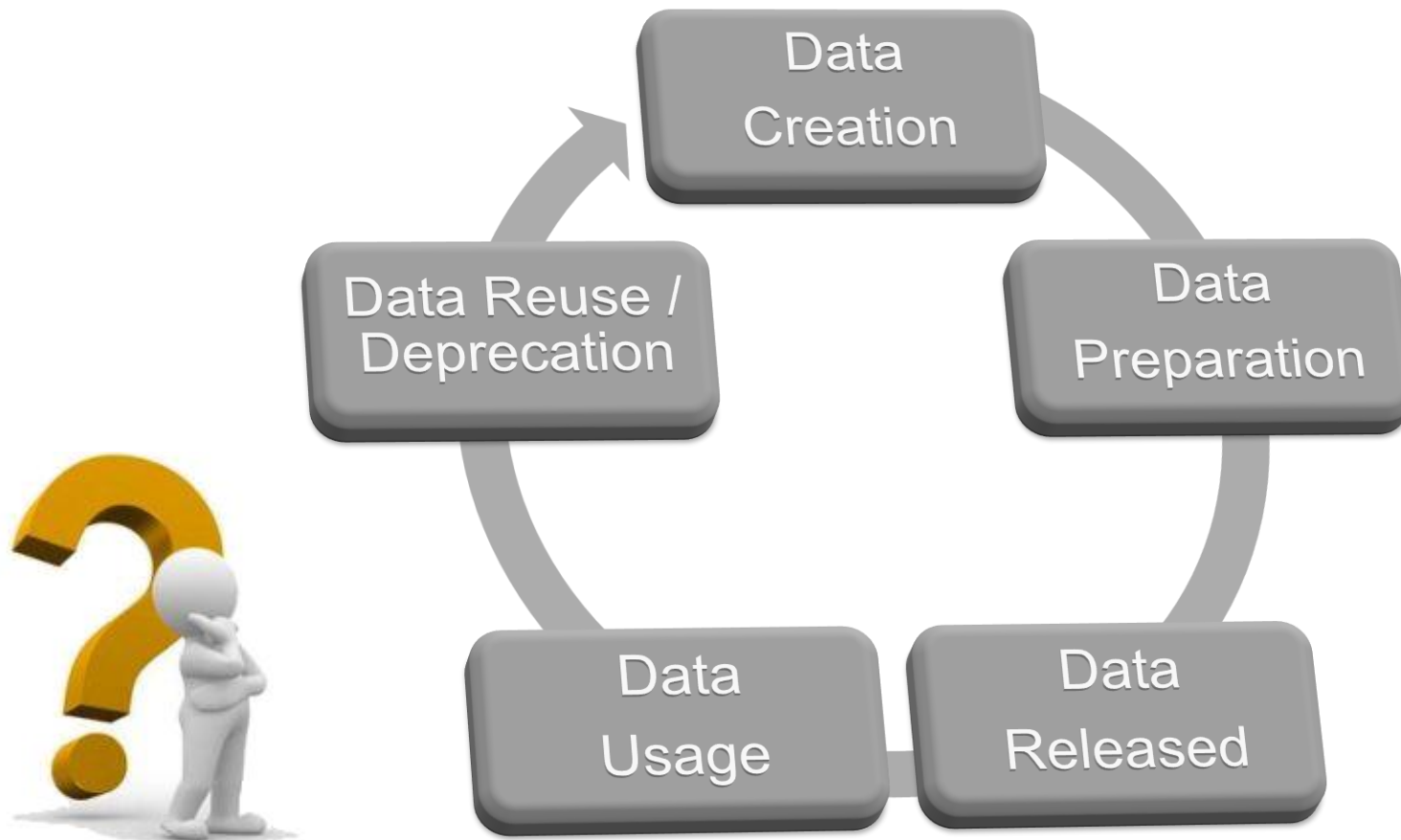
Why automated data validation?

To overcome the situation we have to validate data quality and integrity along all process steps of product development

- Identify errors as soon as possible
- Guide users with relevant information they need at each process step
- Help users to improve collecting of data during creation and modification
- Improve overview of material, documents, BOMs and their dependencies
- Speed up correction of wrong data as early as possible
- a.s.o.

How to ensure data consistency: **Data Lifecycle**

Support the user/system in every step of the data processing.



Agenda

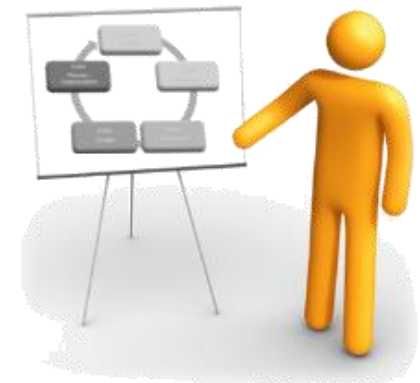
Goal: Good data quality for a successful digital transformation

Part 1: Key points

- Impact of poor data quality
- Causes of data leaks in the PLM system
- Why automated data validation
- How to ensure data consistency

Part 2: Case studies

- Validation during data creation and preparation
- Simplification of a release process
- Changes and Validation Reports





User Stories: Overview

User Story: Create a new Product

Tasks:

- Search to avoid duplicates
- Fill a list of required attributes
- Check dependencies to other product lines
- Trigger the process for other departments



Data Creation / Preparation

- Input Validation
- Create BOM and Relations

User Story: Release an Assembly for manufacturing

- Check multiple bill of materials
- Check history
- Control all required documents and certificates
- Avoid usage of obsolete materials
- All technical documents are up-to-date
- Correct descriptions in sub-components
- Check firmware information (Polarion)
- Schedule and Milestones
- ...



Data Release

- Assembly ready for manufacturing

User Story: Data Analysis and Validation Reports

Analysis and reporting to improve the data quality:

- Reports on the base of simple defined check conditions
- Validation on all existing data in your PLM-System and connected Systems
- Query-Engine for a direct integration in existing Reporting-Services
- Report for the data quality of newly migrated data
- Clean-up feature for pre-active data correction



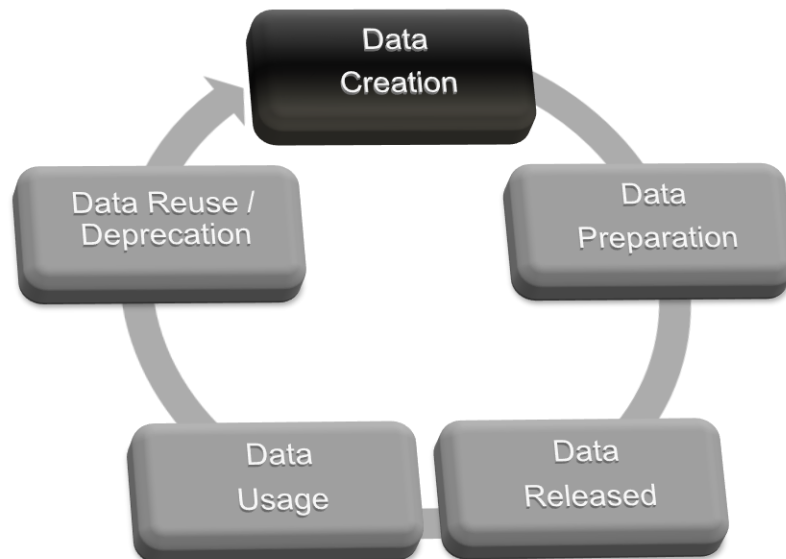
Data Usage

- Bill of Material Changes
- Analysis and Reports

How to ensure data consistency: Options

Data Creation / Preparation: Avoid incorrect entries

- Automation of data checks (for example, during create, revise, classify, ...)
- Automatically fill forms based on existing data
- Guide on relation creation or on BOM modifications
- Data validation in every application (Teamcenter RAC, Active Workspace, NX,...)



User Story: Create a new Part

User actions:

- Search to avoid duplicates
- Fill a lot of required attributes
- Check dependencies to other product lines
- Check external sources

...

The image illustrates the process of creating a new part in CAD'N ORG through three sequential screenshots connected by yellow arrows.

First Screenshot: Advanced Search

- Dialog title: **Advanced Search**
- Tabs: **Quick**, **Advanced**
- Fields:
 - Item Revision... (dropdown)
 - Name: Customized (text input)
 - Alias: Assembly (text input)
- Buttons: Clear All, Add

Second Screenshot: Add

- Dialog title: **Add**
- Tabs: **New**, **Palette**, **Search**
- Selected item: **CNO_SLE_DETAIL_ITEM**
- Section: **PROPERTIES**
- Fields:
 - ID: * (DETAIL-AA"-nnn) (text input)
 - DETAIL-AB-680 (text input)
 - Revision: * (A) (text input)
 - A (text input)
 - Name: * Customized (dropdown)
 - Description: Any (dropdown)

Third Screenshot: Add

- Dialog title: **Add**
- Tabs: **New**, **Palette**, **Search**
- Fields:
 - Sub Type: (dropdown)
 - Material Type: (dropdown)
 - Material Manufacturing type: (dropdown)
 - Manufacturing precision: (dropdown)
- Section: **INFORMATION**
- Fields:
 - MFD X: (text input)
 - MFD Y: (text input)
 - MFD Z: (text input)

User Story: Create a new Part

Simplified Object Creation:

- Prevent inconsistent data in the creation process
- Fix errors as soon as possible
- Ramp-up of user knowledge to company standards
- Smooth usage of data in every step
- Avoid invalid data with deeply integrated check conditions

Check for
duplicates during
object creation
with user hints

The screenshot shows a software interface for creating a new part. It features a 'Summary' tab and an 'Attachments' tab. The 'Summary' tab contains several input fields and error messages:

- ID:** A text field with the value 'DETAIL-AB-463 - AA'. Above it, a hint says '("DETAIL-"AA"- "nnn")'.
- Error Message:** A grey box states 'This name is already used by another Item. Combination must be unique'.
- Customized:** A red dropdown menu with the value 'Customized'.
- Description:** A yellow text area with a hint 'The description is optional'.
- Unit of Measure:** A dropdown menu with the value 'each'.
- Sub Type:** A grey box at the bottom states 'Sub Type is required Assembly, Detail, Standard_Collector, Flexible_Collector are valid'.

On the right side of the interface, there is a vertical toolbar with various icons for information, navigation, and editing.

User Story: Create a new Part

The screenshot displays the Siemens Teamcenter web interface. The browser address bar shows a URL from a Siemens client. The main content area is titled 'Demo Stories (7 Objects)' and shows an overview of the folder's contents. A left sidebar lists several user stories, including 'User Story: Workflow Validation', 'User Story: Simplify Design', 'User Story: Release an Assembly', 'User Story: Filling Forms', 'User Story: Dependency Check', and 'User Story: Create a new Product'. The main area shows the 'Overview' tab with a table of contents.

Object	Type	Owner	Group ID	Date Modified	Release Status
User Story: Create a new Product	Folder	user01 (user01)	dba	08-May-2019 15:48	
User Story: Dependency Check	Folder	user01 (user01)	dba	10-Oct-2018 18:22	
User Story: Dependency Check ...	Folder	user01 (user01)	dba	27-Oct-2018 16:28	
User Story: Filling Forms	Folder	user01 (user01)	dba	11-Oct-2018 13:45	
User Story: Release an Assembly...	Folder	user01 (user01)	dba	19-Oct-2018 16:02	
User Story: Simplify Design Rele...	Folder	user01 (user01)	dba	17-Apr-2019 10:10	
User Story: Workflow Validation	Folder	user01 (user01)	dba	09-Mar-2019 22:24	

Demo:
Item Creation
with input
validation



User Stories: Overview

User Story: Create a new Product

Tasks:

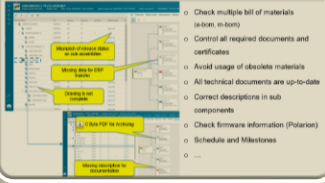
- Search to avoid duplicates
- Fill a list of required attributes
- Check dependencies to other product lines
- Trigger the process for other departments



Data Creation / Preparation

- Input Validation
- Create BOM and Relations

User Story: Release an Assembly for manufacturing



Data Release

- Assembly ready for manufacturing

User Story: Data Analysis and Validation Reports

Analysis and reporting to improve the data quality:

- Reports on the base of simple defined check conditions
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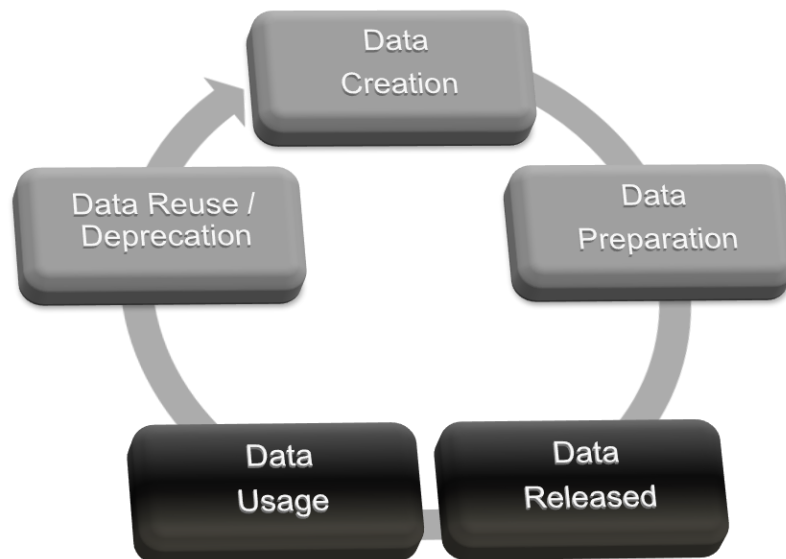
Data Usage

- Bill of Material Changes
- Analysis and Reports

How to ensure data consistency: Options

Data Release / Usage: Reduction of complexity

- Readable error messages
- Work instructions directly available (for example, wrong assignment of a component)
- Pre check (complete display of errors with work instructions)
- Validate each component (assembly specific conditions, dependency checks)



User Story: Release an Assembly for manufacturing

00050000/001;1-TRUCK ASSEMBLY

Element Name	ID	Revision	Sequence	Quantity	Release Status
CARRIAGE ASSEMBLY	00050004	001	30		
HOPPER	00050032	001	10		Approved
FENDER ASSEMBLY x2	00050036	001	80	2	
RUBBER	00050038	001	30		Approved
FENDER	00050037	001	40		Approved
LAMP REAR ASSEMBLY x2					
LAMP REAR SHELL					
LAMP REAR GLASS					
BOOTH ASSEMBLY					
GRILL					
ENGINE HOOD					
DOOR x2					
CHAIR x2					
STEP RIGHT	00050027	001	80		Approved
STEP LEFT	00050026	001	90		Approved
LAMP FRONT ASSEMBLY					
LAMP FRONT GLASS					Approved
LAMP FRONT SHELL					Approved
BUMPER	00050025	001	130		Approved
	00050022	001	140		Approved

Issues identified:

- Mismatch of release status on sub assemblies
- Missing data for ERP transfer
- Drawing is not complete
- 0 Byte PDF for Manufacturing
- Missing description for documentation

- Check multiple bill of materials (e-bom, m-bom)
- Control all required documents and certificates
- Avoid usage of obsolete materials
- All technical documents are up-to-date
- Correct descriptions in sub components
- Check firmware information (Polarion)
- Schedule and Milestones
- ...

User Story: Release an Assembly for manufacturing

Manual checks (costly / time consuming)

- Quality level depends on user (project pressure)
- Quality level subjects to human error
- Several sources: rules, documentation, methods
- Several applications: Teamcenter, ERP-System, ...



Requirement: Automated "Check BOM"

- Check a complete bill of material (expansion on all level)
- Check attributes based on other attributes
- Check for dependent fields and objects on BOM components
- On demand validation without workflow complexity

User Story: Release an Assembly for manufacturing

Ad-Hoc Validation

- Pre-Validation before starting the release process
- Direct integration and validation in any processing step
- Optional post processing based on the result of the verification

Open your assembly in Active Workspace

Element Name	ID	Revision	Sequence	Quantity	Release Status...	Last I...
CARRIAGE ASSEMBLY	00050004	001	30			
HOPPER	00050032	001	10		Approved	user01
FENDER ASSEMBLY v2	00050036	001	80	2		
RUBBER	00050038	001	30		Approved	user01
FENDER	00050037	001	40		Approved	user01
LAMP REAR ASSEMBLY v2	00050040	001	100	2		
LAMP REAR SHELL	00050041	001	10		Approved	user01
LAMP REAR GLASS	00050042	001	20		Approved	user01
BOOTH ASSEMBLY	00050021	001	120		Approved	user01
GRILL	00050024	001	20		Approved	user01
ENGINE HOOD	00050023	001	30		Approved	user01
DOOR v2	00050038	001	40	2		
CHAIR v2	00050029	001	50	2		
STEP RIGHT	00050027	001	80		Approved	user01
STEP LEFT	00050026	001	90		Approved	user01
LAMP FRONT ASSEMBLY v2	00050030	001				
LAMP FRONT GLASS	00050034	001				
LAMP FRONT SHELL	00050033	001				
BUMPER	00050025	001				

Recursive: Components will be checked too

PROPERTIES
ID: 00050000
Revision: 001
Revision Name: TRUCK ASSEMBLY
Description:
Occurrence Name:
Reference Designator:
Sequence:
Quantity:
Unit Of Measure:
Release Status:
Date Released:
Release Effectivity:
Element Effectivity ID:
Element Effectivity:
Owner: user01 (user01)
Group ID: Engineering
Last Modifying User: user01 (user01)
Precise: False

GLOBAL ALTERNATES

PREVIEW
Image of a green truck assembly.

Demo: Assembly validation

- Check a complete bill of material (all levels)
- Checks dependent attributes or related objects
- Check properties of sub components

[Video](https://youtu.be/rT028Gk61PE)

<https://youtu.be/rT028Gk61PE>



User Stories: Overview

User Story: Create a new Product

Tasks:

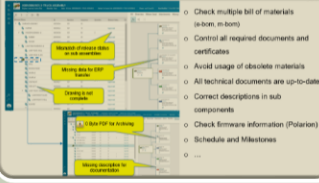
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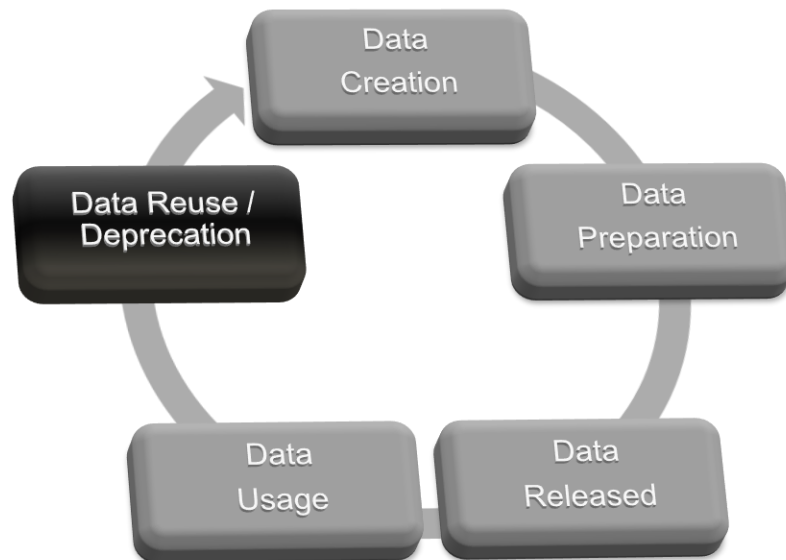
Data Usage

- Bill of Material Changes
- Analysis and Reports

How to ensure data consistency: Options

Data Deprecation: Validation of existing and old data

- Cyclic review of data in Teamcenter (reports)
- Use same procedure / rules for all validations
- Compare options with previous Revisions or different BOM



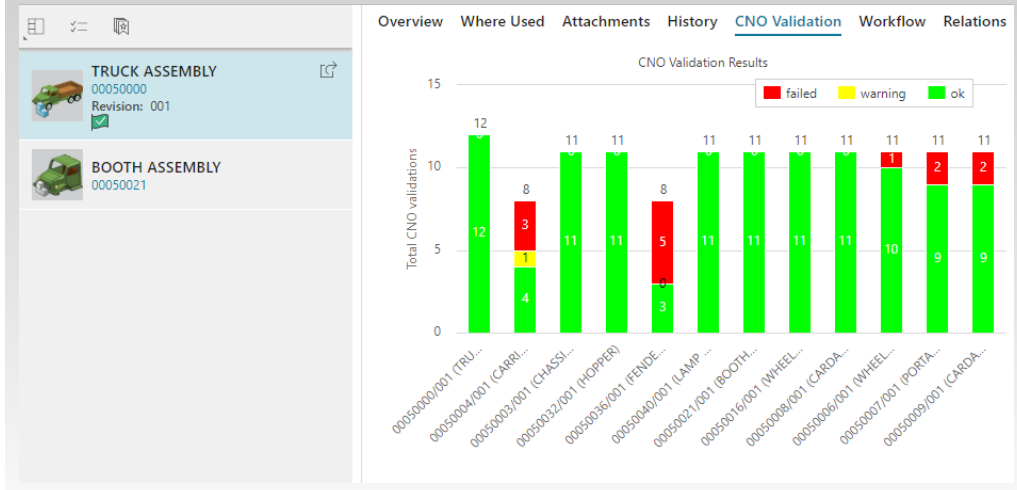
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Sample: Batch Validation (Report)





CNO Validation Framework: Data Lifecycle Support

✓ Creation...

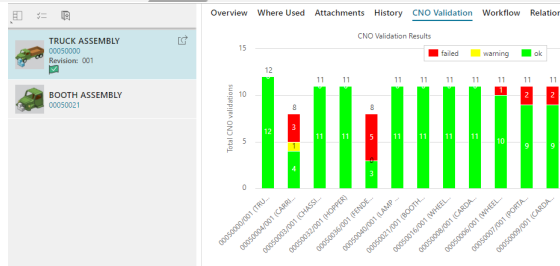
Validate input data for objects and relations in any application

✓ User Interface...

Pre-validation to avoid process errors

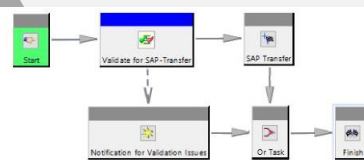
✓ Reports...

Data analysis and reporting of incomplete or missing data



✓ Workflows...

Extends existing workflows with validation functionalities



✓ Stylesheet...

Overview without a single click

Conclusion: Automated data validation

Enablers of better performances and competitiveness:

- **Speed up** the process
- **100%** reliable quality checks
- **Much better** usability
- **More** validation capacity
- User needs **no** intensive training
- Flexibility and agility to adapt to new needs
- Every information in **one location**
- Every thing in **one application**
- **Avoid** costly mistakes
- **Data quality:**



Teamcenter: Data Validation – Questions?

CAD 'N ORG GmbH

Eisenstrasse 2-4
DE-65428 Ruesselsheim

www.cadnorg.com

info@cadnorg.de



Oliver Yalcintepe

Head of Development
CAD 'N ORG GmbH

Contact:
oyalcintepe@cadnorg.eu